Paper No. 24

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DANIEL P. HUTTENLOCHER,
PETER C. WAYNER,
and MICHAEL J. HOPCROFT

Appeal No. 1998-0643
Application 08/196,028[1]

ON BRIEF

Before JERRY SMITH, BARRETT, and HECKER, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

[1] Application for patent filed February 14, 1994, entitled "Method For Determining Boundaries Of Words In Text," which is a continuation of Application 07/794,392, filed November 19, 1991, now U.S. Patent 5,321,770, issued June 14, 1994.

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1-5, 8-12, 19, 21, 22, and 26-30. Claims 6, 7, 13-18, 20, 23-25, and 31-33 have been canceled.

We affirm-in-part.

BACKGROUND

The disclosed inventions relate to: (1) a method of isolating a word object (e.g., claim 1) by smearing the image of the adjacent symbols of a word object together to form a group of connected symbols and determining the boundaries of the group of connected symbols to isolate the word object; and (2) a method of determining the text baseline or text topline (e.g., claim 26) using a histogram of the number of pixels lying along a series of lines through the lines of text.

Claim 1 is reproduced below.

> 1. A method of isolating a word object composed of multiple adjacent symbols within data defining a first image, comprising the steps of:
>
> (a) producing a second image, as a function of the first image, where the adjacent symbols which form the word object are represented in the second image as having at least one point of contact between one another, thereby representing the word object as a group of connected symbols;

(b) locating the connected symbols within the second image;

(c) identifying boundaries about each group of connected symbols within the second image, so as to segment the second image by word objects; and

(d) applying the boundaries identified in step (c), to the first image to group the data associated with each word object, thereby isolating the word object within the data defining the first image.

The Examiner relies on the following prior art:

Schlang 4,558,461 December 10, 1985
Bloomberg et al. (Bloomberg) 5,048,109 September 10, 1991
Tanaka et al. (Tanaka) 5,054,091 October 1, 1991

Claims 1 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bloomberg and Tanaka.

Claims 2-5, 8-11, 19, 21, 22, and 26-30 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bloomberg, Tanaka, and Schlang.

We refer to the Final Rejection (Paper No. 15) and the Examiner's Answer (Paper No. 23) (pages referred to as "EA__"), which incorporate by reference the reasons for rejection in the previous Official Action (Paper No. 12), for a statement of the Examiner's position, and to the Brief (Paper No. 22) (pages referred to as "Br__") for Appellants' arguments thereagainst.

OPINION

Grouping of claims

Appellants state that for each ground of rejection, the claims stand or fall together (Br15). This is logical for the group consisting of claims 1 and 12, because claim 12 depends on claim 1. This grouping does not make sense for the group consisting of claims 2-5, 8-11, 19, 21, 22, and 26-30 because there are two different inventions claimed. Claim 19 contains the same limitations as claim 1 plus another limitation about skew and is directed to the idea of identifying boundaries between word objects and isolating word objects. Claims 26-28 are directed to methods for determining the text baseline, topline, and separation between topline and baseline pairs after determining skew. Thus, claims 26-28 are considered separately from claims 2-5, 8-11, 19, 21, 22, 29, and 30.

Claims 1 and 12

The Examiner finds that Bloomberg teaches the limitations of claim 1 except for the step of identifying the boundaries about each group of connected symbols and, in particular, that figure 14B discloses producing a second image in which a word object is represented as a set of connected symbols (Paper

No. 12, p. 3). The Examiner finds that Tanaka teaches locating connected strings and identifying boundaries about each connected word string (Paper No. 12, p. 3). The Examiner concludes (Paper No. 12, p. 3): "It would have been obvious to one of ordinary skill in the art to combine the teachings of Bloomberg and Tanaka in order to isolate a word in an image because Bloomberg teaches a technique to connect all characters of a word to form a connected string, and Tanaka teaches locating connected strings by identifying their boundaries."

Appellants argue that the purpose of the "opening" process step in figure 14B of Bloomberg is to remove noise as well as the outlines of non-highlighted characters as one step in a continuum of steps to identify regions of an image that were highlighted using a conventional color highlight pen and is not directed to isolating words objects (Br16-18).

The Examiner responds that once the highlighted region has been determined, the "opening" step effectively isolates word objects in question and it is of no moment that the step is part of a continuum of steps (EA3-4).

We find Bloomberg meets step (a) of claim 1, where the first image is the highlighted portion 110 of figure 14A and figure 14B is the second image. All words within the highlighted portion 110 are connected together by the OPEN operation. Step (a) of claim 1 is directed to "blobifying" word objects, which is shown by figure 14B, and says nothing about isolating the word objects. However, we find Bloomberg does not disclose steps (b), (c), or (d) of claim 1 because Bloomberg is directed to identifying a highlighted region (HR) by creating an HR mask of ON pixels, as shown in figure 14C, not to identifying word objects. That is, the image containing connected symbols in figure 14B is filled in by a CLOSE step to produce the HR mask of figure 14C and is not used to isolate word objects. The Examiner's rejection relies on Tanaka for teaching the boundary and word object limitations.

Appellants argue that Tanaka is directed to determining the coordinates of a circumscribed rectangular frame for enclosing each character, not word, and there must not be any interconnection between adjacent characters or the Tanaka method will fail to accomplish its stated purpose (Br18). It

is argued that the claims expressly require a word object to include multiple symbols or components (Br19). It is argued that there is no teaching that Tanaka would operate in the same manner if the symbols were characters connected together to form word objects (Br19) and that it is hindsight to apply Tanaka to merged characters so as to circumscribe an entire merged area (Br20).

The Examiner's position is that it would have been obvious to apply the method of Tanaka, which draws boxes around characters separated by spaces, to Bloomberg where there are merged symbols (EA6). The Examiner previously stated (Paper No. 12, p. 4-5): "(I) the rationale for the rejection is that although Tanaka teaches boxing individual characters from connected symbols, the process would operate in the same manner if the symbols were character fragments connected to form character objects, or if the symbols were characters connected to form word objects, and (II) in the case where a word object is a single character such as 'a' or 'I' or some other symbol, the claimed invention operates on characters."

We find no motivation for the proposed modification either in the references or in the knowledge of one of ordinary skill in the art. There is no suggestion in Bloomberg or Tanaka to bound word objects. "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992), citing In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). The merged characters in figure 14B of Bloomberg are only part of a series of steps to determine a highlighted region and there is no suggestion that the intermediate data of figure 14B should be used to determine word objects. There is no suggestion in Tanaka that the method could be applied to determining the boundaries of a word object. It is clear that the Examiner has used hindsight to motivate the combination. We conclude that the Examiner has failed to establish a prima facie case of obviousness. The rejection of claims 1 and 12 is reversed.

Claims 2-5, 8-11, 19, 21, 22, 29, and 30

Schlang discloses a text line bounding system for non-mechanically adjusting for skewed text in scanned text. In particular, Schlang discloses a method and apparatus for finding the datums (baselines) of the lines of text, the top and bottom text lines, and the right and left text line boundaries after deskewing text. The Examiner relies on figure 10, column 9, lines 49-68, for disclosure of a one-dimensional histogram for determining the datums of the text lines (Paper No. 12, p. 4).

Appellants argue that "Schlang does not teach the division of a text line into word objects as required by the rejected claims" (Br20). It is argued that the Examiner has not provided any basis for the combination and "that such a combination does not teach the recited elements of the rejected claims, namely the determination of a skew angle and the orientation of the boundaries about word objects with respect to the skew angle, as recited by the rejected claims" (Br21).

The Examiner responds that Schlang demonstrates that it was well known to determine skew angles prior to boxing words or text lines and that it would have been obvious to determine

skew as taught by Schlang prior to executing the method of Bloomberg and Tanaka (EA7).

Schlang discloses determining and correcting for skew before performing other operations. However, Schlang does not cure the deficiencies of Bloomberg and Tanaka as to the limitations of identifying word object boundaries and isolating word objects in claim 1. Accordingly, the rejection of dependent claims 2-5 and 8-11 is reversed. Independent claim 19 contains the same limitations as claim 1 in addition to a step of determining the skew angle. Thus, the rejection of claim 19 and its dependent claims 21 and 22 must be reversed. Claim 29 is directed to a method of isolating a word object including a step of determining a skew angle. Claim 29 is broader than claim 1, but it still requires the step of locating the boundaries of symbols grouped to the word object, which is not found in Bloomberg, Tanaka, or Schlang. Thus, the rejection of claims 29 and 30 is reversed.

Claims 26-28

Claims 26-28 do not contain any limitations of identifying word object boundaries and isolating word objects, but are directed to determining the text baseline (claim 26),

the text topline (claim 27), or the average character height as a distance between the text topline and text baseline (claim 28). Appellants do not separately argue the application of Schlang to claims 26-28. Therefore, we sustain the rejection based on lack of argument in the brief. See 37 CFR § 1.192(c)(8)(iv) (1996) ("For each rejection under 35 U.S.C. 103, the argument shall specify the errors in the rejection and, if appropriate, the specific limitations in the rejected claims which are not described in the prior art relied on in the rejection, and shall explain how such limitations render the claimed subject matter unobvious over the prior art."). Nevertheless, we briefly consider Schlang with respect to representative claim 26.

Schlang determines a skew angle representative of the orientation of the text line to "derotate" the page before bounding (e.g., col. 7, lines 22-27). A histogram is prepared by projecting the number of character pixels along horizontal lines at vertical addresses into a one-dimensional Histogram Buffer oriented in a direction perpendicular to the orientation of the text line (figure 10; col. 9, line 49 to col. 10, line 2; cols. 15-16 under "DATUM HISTOGRAM

ANALYSIS"). The peaks represent the most probable positions of the text line datums (col. 9, lines 61-62). The frequency of the peak must exceed a minimum peak threshold before the peak can be a datum and to discriminate between rising and falling conditions (col. 15, lines 39-53). It is not known why Schlang's figure 10 has a different shape than Appellants' figure 5A since the frequency distribution curve is prepared in exactly the same way. In our opinion, one of ordinary skill in the art would have recognized that the peaks between minima in a frequency distribution curve as prepared by Schlang represent the text topline and text baseline. For this reason, while not identically disclosed in Schlang, we conclude that claim 26 would have been obvious over Schlang alone. In summary, the rejection of claims 26-28 over Bloomberg, Tanaka, and Schlang is sustained both because the rejection has not been argued as required under United States Patent and Trademark Office regulations and because, in any case, the subject matter would have been obvious.

CONCLUSION

The rejections of claims 1-5, 8-12, 19, 21, 22, 29, and 30 are reversed.

The rejection of claims 26-28 is sustained.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

JERRY SMITH Administrative Patent Judge	)
LEE E. BARRETT Administrative Patent Judge	) BOARD OF PATENT APPEALS AND INTERFERENCES
STUART N. HECKER Administrative Patent Judge	)

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